

05-10-2001

ART 34 AMDT

14

CLAIMS

1. An electronic detonator comprising an ignition charge, a battery unit for emitting igniter current for initiating the ignition charge, and an electronic circuit for controlling said emission of igniter current, the battery unit being movable in the detonator between a resting position and an activated position, in which the battery unit is connected for emitting said igniter current in a controlled way, and battery activating means being provided, in response to external activation, for pyrotechnically causing the battery unit to move from the resting position to the activated position, wherein the battery unit has the shape of a plunger or piston and is arranged in a corresponding bore in the detonator, the bore being arranged in a tubular element which is dimensionally stable and resistant to mechanical action and which has a longitudinal extension preferably essentially corresponding to a longitudinal extension of the detonator, the battery unit being movable in said bore from its resting position to its activated position against the action of a frictional force.

2. A detonator as claimed in claim 1, wherein said battery activating means comprise a pyrotechnic ignition tube which is connected to the detonator.

3. A detonator as claimed in claim 1 or 2, wherein said battery activating means comprise a drive charge for the battery unit, the drive charge being arranged in the detonator.

4. A detonator as claimed in claims 2 and 3, wherein the ignition tube is connected for initiating said drive charge.

5. A detonator as claimed in claim 3 or 4, wherein the drive charge is arranged in a drive chamber, to which an actuation part of the battery unit is exposed to be acted upon so as to cause movement by means of a driving

05-10-2001

ART 34 AMDT

15

pressure which is generated in the drive chamber by the drive charge.

6. A detonator as claimed in claims 4 and 5, wherein a non-return valve is arranged at an ignition tube connection to the drive chamber in order to prevent driving pressure generated in the drive chamber from being discharged via the ignition tube.

7. A detonator as claimed in claim 5 or 6, wherein the drive chamber is arranged in a tubular element extension aligned with said bore.

8. A detonator as claimed in any one of claims 5-7, wherein the walls of the tubular element and the drive chamber are formed as a pressure vessel in order to resist a predetermined driving pressure.

9. A detonator as claimed in any one of the preceding claims, wherein the bore in the detonator is formed in such a manner that, when the battery unit is in its activated position, a free space remains in front of the battery unit, in which gas pushed forward by the battery unit can be compressed.

10. A detonator as claimed in any one of the preceding claims, wherein the frictional force is adapted to increase after the battery unit has moved an initial distance from the resting position.

11. A detonator as claimed in any one of the preceding claims, wherein the frictional force is adapted to successively increase to stop the motion of the battery unit at the end of the motion process.

12. A detonator as claimed in any one of the preceding claims, comprising friction generating elements on the bore wall and/or the bore facing surface of the battery unit.

13. A detonator as claimed in claim 12, wherein said friction generating elements comprise projections on the bore wall for engaging with the bore facing surface of the battery unit.

14. A detonator as claimed in claim 13, wherein the projections comprise rib elements which preferably extend parallel to the direction of motion of the battery unit.

15. A detonator as claimed in claim 13 or 14, 5 wherein the height of the projections from the bore wall is increased at the battery unit activating end of the bore.

16. A detonator as claimed in any one of claims 12- 10 15, wherein the motion-counteracting frictional force is adapted to prevent motion of the battery unit to the activated position in connection with action due to acceleration in the direction of motion, at least up to a predetermined level.

17. A detonator as claimed in any one of the 15 preceding claims, wherein the battery unit has at least one contact terminal which in a non-activated position of the battery unit is coated with insulation and which in the activated position of the battery unit is adapted to be penetrated by a co-operating contacting means in the detonator.

18. A detonator as claimed in claim 17, wherein a contact terminal which is coated with insulation is arranged on the bore side of the battery unit and wherein a co-operating contacting means is arranged protruding in 25 the bore, so that when the battery unit is in the activated position, the contacting means penetrates the insulation of the contact terminal and is in contact with the contact terminal.

19. A detonator as claimed in claim 17 and any one 30 of claims 12-16, wherein said contacting means is included in said friction generating element.

20. A detonator as claimed in any one of claims 17- 19, wherein the battery unit on its front end side is provided with a contact terminal which is coated with 35 insulation and which is adapted to be contacted, when the battery unit is in its activated position, by a contact

pin which penetrates the insulation and is arranged in the bore.

21. A detonator as claimed in any one of the preceding claims, further comprising a contact arrangement in a line circuit for emitting igniter current from the battery unit, the contact arrangement being open in a state of rest and closed in an activated state, the contact arrangement being adapted to be moved from the state of rest to the activated state in response to the pyrotechnic activation.

22. A detonator as claimed in claim 21, wherein the direction of motion of the battery unit from the resting position to the activated position and a direction of motion of the contact arrangement when passing from an open to a closed state are substantially separated, preferably at least essentially opposite or essentially orthogonal.

23. A detonator as claimed in any one of the preceding claims, wherein the motion of the battery unit from the resting position to the activated position occurs towards the ignition charge, the distance of motion being preferably at least about 1 cm.

24. A detonator as claimed in any one of the preceding claims, wherein the battery unit, in its resting position, is completely encapsulated in an electrically insulated fashion.

SEARCHED
INDEXED
COPIED
FILED